

## PRELOAD IN WHEEL BEARINGS

**W**hat is preload?

Preload describes a bearing setting that does not have any internal axial clearance in the bearing system. The Technology & Maintenance Council (TMC) defines preload in RP 640 as “the condition in which endplay has been removed and the bearings have an axial load due to the force applied by the fastener assembly.” The Society of Automotive Engineers (SAE) describe preload more specifically as “a load resulting from an axial interference between the bearing’s rolling elements and races resulting in no discernible axial wheel-end movement when a force is applied, first in one axial direction and then in the opposite direction, after oscillating the wheel end.” Simply stated, preload represents a tight bearing setting, whereas endplay represents a loose setting.

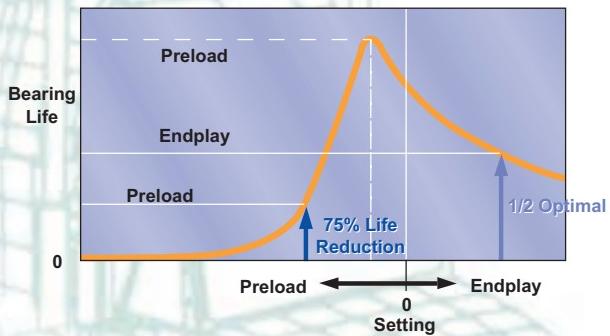
**Do you want preload in your wheel bearings?**  
 When truck and trailer wheel ends are adjusted in a controlled manner, slight preload can be beneficial to the success of long wheel end life. Slight preload can improve bearing, seal and tire life, but only if the entire process is in control. “In control” means that you actually know the bearing setting process will result in a consistent bearing setting range.

### Traditional Wheel Ends (2 single-row bearings adjusted with a fastener)

Endplay should be measured with a dial indicator on this type of wheel end. Steps for using a dial indicator are described in Tech Tip Volume 1, Issue 7\*. Unfortunately, neither dial indicators nor any other standard tool will tell a technician the amount of preload in the wheel end. While endplay

is measured by axial travel, preload is measured by the force in the bearing system. To date, there isn’t anything available that will confirm that the fastener is providing the correct preload setting. Be aware that if you are attempting to set preload in a traditional wheel end, you are depending on the quality of all the components and the skill of the technician to get it correct every time.

The benefits of a light and controlled preload bearing setting are negated if bearing preload force is excessive. Excessive preload can cause high operating temperatures, reduced lubricant life, reduced seal life, and premature bearing damage. Bearing lock-up and/or wheel end separation may occur if the preload force is excessive.



### Pre-adjusted Wheel Ends (spacer located between the bearings)

Setting is controlled by tighter tolerance control during manufacturing of all the wheel end components of pre-adjusted wheel ends. The spacer – in combination with special Set-Right™ bearings – and hub create the proper bearing adjustment. The fastener secures the wheel end, but has minimal effect on the bearing setting. Because bearing setting is controlled through the

Use these guidelines, to 3-hole punch Tech Tips and store it in a binder.

special components designed into this style of wheel end, the wheel end is designed to operate in a slight preload to slight endplay setting range.

### Unitized Wheel Ends (cartridge bearings)

Setting is established during the bearing manufacturing process for unitized wheel ends. The same precision used to manufacture bearing components is applied to setting the bearings. The very narrow setting range optimizes bearing life with a slight and controlled preload setting. Setting the bearings at a Timken facility allows us to precisely and accurately adjust cartridge bearings so that bearing, seal and tire life can be optimized. This precision creates a high performing wheel end.

**So, do you want preload in your wheel bearings?**  
It depends on the wheel end design and the quality of the components used. If the



traditional design is your preferred wheel end, be careful to avoid excessive preload, the risks are serious. However, new wheel end designs utilizing Timken quality components create opportunities to safely use slight preload, reduce maintenance costs and improve fleet profitability.

\* The eleven issues of Tech Tips Volume 1 discuss Timken's suggestions for proper adjustment of this type of wheel end. Previous Tech Tips can be obtained at [www.timken.com](http://www.timken.com).

### WARNING!

Proper maintenance and handling practices are critical. Failure to follow installation instructions and to maintain proper lubrication can result in equipment failure creating a risk of serious bodily harm. Never spin a bearing with compressed air. The rollers may be forcefully expelled creating a risk of serious bodily harm.

### SAFETY CHECK

According to the National Transportation Safety Board, the incidence of wheel separations is about 750 to 1,050 per year. The Safety Board identified improper wheel maintenance as a potential cause. Most often cited were inadequate in-service inspection guidelines and failure to adhere to recommended maintenance practices. At The Timken Company, we care about the safety of you and everyone on the road. That's why we do our best to bring you recommended inspection and maintenance guidelines that keep everyone safe.

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